Ground-breaking experiment artifact now at the Bradbury

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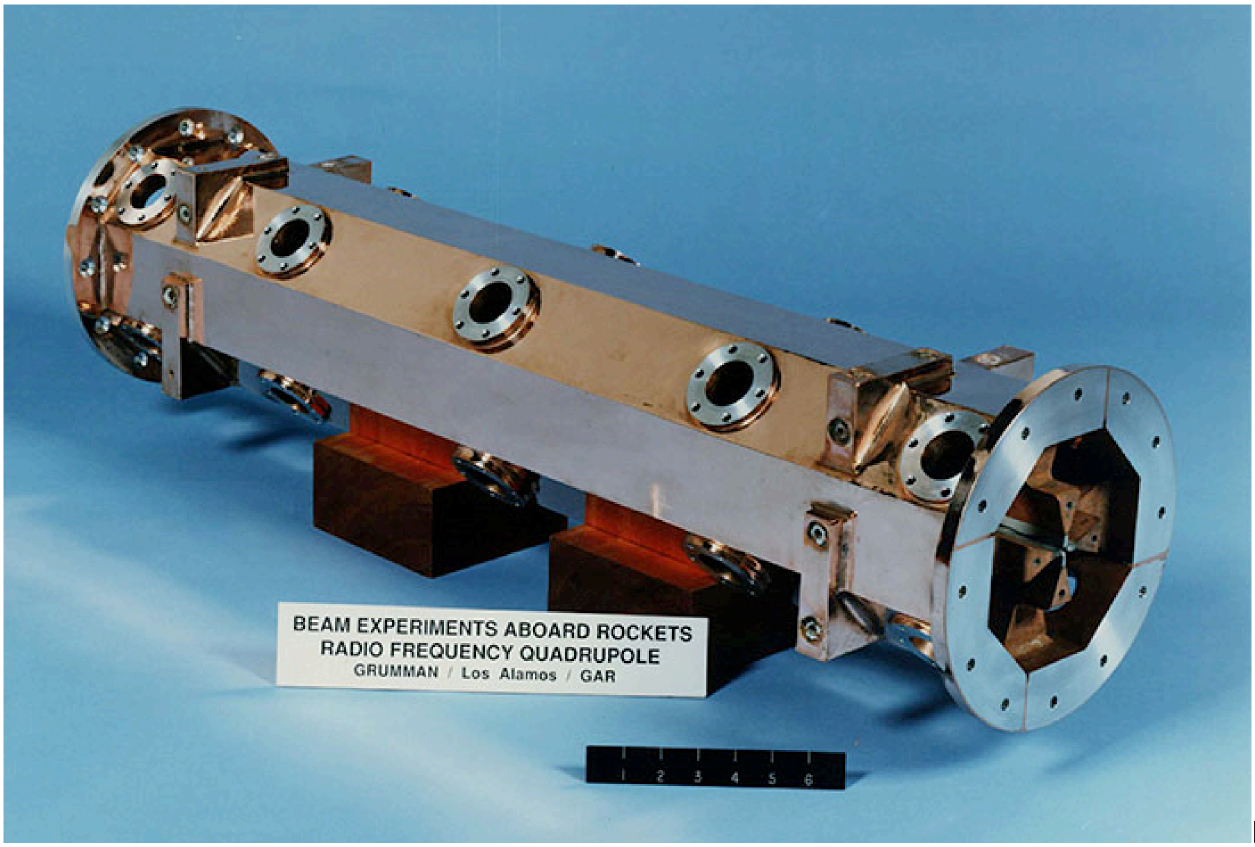

Back in the mid 1980s, the Department of Defense formed its Strategic Defense Initiative Organization to respond to potential nuclear attacks. In connection with that work, on July 13, 1989, the Lab conducted an experiment called BEAR, an acronym for Beam Experiment Aboard a Rocket. The purpose was to operate a low-energy accelerator—a neutral particle beam (NPB) accelerator—in space. The beam produced by such an accelerator was intended to disable an incoming warhead.

The NPB technology needed to be tested to determine: if it could be kept lightweight but also rugged enough to withstand launch; if it could operate autonomously; and if it would operate as expected under the conditions of space. Such an experiment had never before been attempted.

According to a summary of the 11-minute experiment—it worked as expected!

The BEAR experiment successfully demonstrated operation of an NPB accelerator and propagation of the neutral beam as predicted in space, obtained first-of-a-kind NPB space physics data, and demonstrated the ability of the BEAR accelerator to survive recovery and to continue operating normally. No unanticipated phenomena were *encountered that would significantly delay further development of NPB technology for defensive, space-based weapon systems.*

In the Lab's publication *Research Highlights*, then Lab Director Sig Hecker said of the success:

This payload, the culmination of four years of work by a team of specialists from Los Alamos, other government agencies, and industry, made history a few minutes later by escaping Earth's atmosphere and firing hundreds of neutral (electrically uncharged) particle beams, or NPBs, in space. The success of this experiment lent credence to the vision of researchers around the country who believe that a space-based missile defense system may someday protect the nation from a nuclear attack.

The artifact now in our possession is a duplicate of the accelerator's radio frequency quadrupole (RFQ). What's an RFQ, you ask?

According to a primer from European Organization for Nuclear Research (also know as CERN):

The Radio Frequency Quadrupole is a linear accelerator which focuses, bunches and accelerates a continuous beam of charged particles with high efficiency and preserving the emittance. The focusing as well as the bunching and acceleration are performed by a Radio Frequency (RF) electric field.

While the quadrupole was only a part of the experiment-carrying rocket, it was a significant part.

The experiment was considered important enough that the Smithsonian's National Air and Space Museum collection includes a 13-foot-section (3.9 meters) of it. That section, transferred by the Lab to the Smithsonian in 2006, includes the original RFQ that went into space.

In contrast, the Museum's artifact is a modest 38 inches long (.96 meters). Our model is now fully part of our collection. It came to us by way of a former employee of then Grumman Aerospace. That organization helped fabricate the equipment to Lab specifications.

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